IoT based Implementation of Vehicle Monitoring and Tracking system using Node MCU

Boddapati Venkata sai Padmaja, Venkata Ratnam Kolluru , Syam Sai Kota

Abstract: ***In this paper, vehicle monitoring and tracking systems are implemented using Blynk platform acting as a medium for data transfer and visualization. The system is developed to monitor various driver help parameters like eye blinking, alcohol consumption and vehicle parameters like engine temperature, the distance between the vehicles and tracking of the live location of the Vehicle. The Ultrasonic sensor is placed in the front part of the vehicle, if any two vehicles draw near to one another then an alert message is sent to the mail through Blynk application. The Temperature sensor is placed in the engine part. When the temperature raise's in the engine, caution is sent to the mail. Eye-blink sensor and alcohol sensor are utilized to check the condition of the driver, if the state of the driver is abnormal then a notification is sent to mail. The developed system takes care of vehicles and s driver's safety.***

Keywords: Blynk, Cloud, GPS, Sensors.

I. INTRODUCTION

Internet of Things (IoT) is nothing but the devices (things) communicating with each other by using the internet. IoT is a trend-setting innovation in which all the data from sensors is stored in the cloud where it can be easily accessed from the cloud. Sensors and actuators for gathering the data and sending across the internet are also included in this advancement. We use cloud not only to store data but also for data analysis, gathering, visualization. The key characteristics of cloud include on-demand service provision, resource pooling and elasticity. Internet of Things (IoT) means communicating of devices with each other over the internet. Some applications of IoT are Smart energy, smart city health monitoring system. In IoT data is transmitted from sensors and they can be stored and analyzed by diverse IoT platforms like Blynk,Thinger.io, Thingspeak. In the present situation no less than one individual in the family has a vehicle, In the present age everybody inclination is changing regarding time,and they have to complete their works in restricted time, so the need to complete the work as fast as possible, because of that tendency they drive the vehicles very fast risking their lives in order to complete their work resulting to the cost of their life's. In some cases without the intervention of us even we may fall to accidents due to others fault.In this present age the vast majority of them surmise that driving quick is form and those individuals think it is an excite driving quick, yet they couldn't comprehend that it is the greatest hazard that may risk to their lives.Despite with part of checking's a few people still take liquor and drive it prompts peril, it isn't protected to the general population and furthermore to the people in the vehicle. Due to over endure their work or having less rest hours may likewise prompt laziness and because of that the individual who is driving the vehicle may fall a rest or close the eyes for quite a while that may prompts deadly accidents, In few cases the temperature in the motor turns out to be high because of more warmth in the environment or because of loss of coolant these are the most widely recognized issues for the warmth in the engine,Most of the accidents occur because of not maintaining a proper distance between them this is also a serious problem that to be considered, to overcome these issues we had planned a vehicle observing and controlling framework, in that we have utilized distinctive sensors and gathered data from every sensor and data is analyzed using Blynk Application,and we had utilized a GPS module to track the data and here the microcontroller we have used is NodeMCU.

Revised Manuscript Received on April 07, 2019.

Boddapati Venkata sai Padmaja, B.Tech Student, Department of Electronics& Computer Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, AP, India.

Venkata Ratnam Kolluru, Associate Professor, Department of Electronics& Computer Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, AP, India.

Syam Sai Kota, B.Tech Student, Department of Electronics& Computer Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, AP, India

II. LITERATURE REVIEW

Das et al[1] proposed a vehicle accident and location monitoring system. This system provides a mechanism to reduce disasters by monitoring eye blinking of the driver, which indicates drowsiness, obstacles located in the road and the drunken state of the driver. Accident and the location of the vehicle are detected. By this system primary care is received as the accident information is available Anusha et al[2] implemented a system using LPC2148 and the system has features like storing in the database.The work includes GPS, GSM modules. The framework also detects Alcohol consumption and Engine Temperature, All the values can be seen on the Web page.so safety is provided to the travelers in the vehicle. Imteaj et al[3] developed an Android-based application that detects an accidental situation and sends an alert message to the nearest police station and medical care center. This application is organized with an external pressure sensor to extract the outward force of the vehicle body. Hence, the application plays an important role in Post-accident services and could lessen the effect due to an accident Mayuresh et al[4] described a system that uses an open source platform and intended to monitor and trace the location of a vehicle, the framework also checks fuel consumption, engine

temperature and vehicle speed, GPS/GPRS/GSM modules are used for communication. All the values are stored in the data base on the web server.

Prasanth et al[5] are designed and implemented a model that is based on Raspberry Pi and a smartphone android application. The system mainly comprises of three things GPS/GPRS/GSM SIM 900A.The entire setup is placed inside the vehicle. GPRS sends the information to the server and GSM is used for sending the alert messages to the vehicle mobile owner.

Manali et al[6] proposed a system that has an Android mobile assembled with GPS and GSM modules along with a processor that is setup in the vehicle. During the movement of the vehicle, the location of the vehicle is continuously observed in the web server using GPRS.

Harum et al[7] suggested a framework that is based on Raspberry pi that is connected to 3G/4G dongle used as a Modem. The vehicle unit is attached to the vehicle, the attached unit is configured to receive signals from a mobile tower and send it to web server to represent the location on the map in the real time.

Navod et al[8] designed and implemented vehicle tracking, vehicle monitoring, controlling and vehicle status. In this system vehicle door, parking lights, side mirrors are monitored and controlled by a mobilephone.

III. VEHICLE MONITORING AND TRACKING SYTEM

The vehicle monitoring and tracking system have been developed in this paper. An ultrasonic sensor is placed in the front part of the vehicle, if any vehicle draws near then alert message is sent to the mail via Blynk application. To avoid the sparks in the vehicle temperature sensor is utilized and it is placed in the engine part of the vehicle if the temperature inside the car increases then Notification is sent to mail through Blynk. If alcohol consumption is in high range then caution will be sent. If the person feels drowsiness then it is detected by IR sensor and alarm will be in on state and an alert is sent to mail saying the driver is in the drowsy state. The values of all the sensors are collected by NodeMCU as it has inbuilt Wi-Fi module all the data is transferred to the cloud through Wi-Fi and analysis is done in Blynk app and notifications are sent according to the conditions.

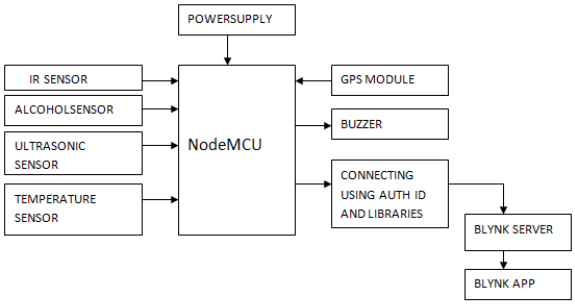

Fig. 1 represents an overview of the proposed system

Sensor:

Choosing a sensor is a difficult task, according to the application requirements we have to choose sensors, if the system has to sustain for long time sensors should work accurately, they should be reliable

Ultrasonic sensor:

Here ultrasonic sensor is used, the reason behind choosing ultrasonic sensor its operation is not affected by sunlight, it has high accuracy rate and stable readings, It is used to detect an obstacle that is near to the vehicle. The sensor used in this prototype model ranges from 2cm-400cm.Ultrasonic sensor mainly comprises of four pins VCC, GND, Echo, Trigger, VCC supply for ultrasonic sensor is usually 5V, GND pin is connected to the ground of the Node MCU,The trig and echo pins are connected to the digital i/o pins on the Arduino board.To generate the ultrasound, you need to set the trig on a high state and the generated sound will be received by the echo pin.

Fig. 2. Picture of Ultrasonic sensor

We can calculate the distance between the two vehicles by using the formula

Distance=(0.034 *time)/2

Gas Sensor:

Here mq3 gas sensor is used, in particular in using mq3 sensor is its conductivity increase as the concentration of alcohol increases, it has high sensitivity and fast response rate.

Gas sensor mainly comprises of four pins, where three pins are used A0, GND, VCC,A0 is analog pin that is connected to analog pin of Node MCU, GND is connected to GND, VCC supply is 3.3v .

Fig 3: Picture of MQ3 sensor

IR Sensor:

IR sensor mainly consists of three pins VCC, GND, Digital pin The power supply for IR sensor is 3.3v and the GND pin of a sensor is connected to GND pin of Node MCU, the digital pin of IR sensor to digital pin of Node MCU

Fig4: Picture of IR Sensor

Temperature sensor:

DHT11 Sensor is used to check the engine temperature .DHT11 sensor consists of three pins, power supply of dht11 is 3.3v, GNDpin is connected to GND pin of NodeMCU, Digital pin of dht11 sensor is connected to Digital pin of NodeMCU.

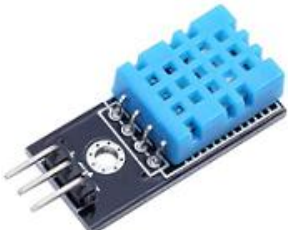

Fig5: Picture of DHT11 sensor

NodeMCU:
The Node MicroController Unit (NodeMCU) is used as a gateway. It has inbuilt Wi-Fi module which is used to send the sensor data to cloud for storage and analysis. The main reason behind selecting NodeMCU is that the sensors used in our project uses only digital pins and one analog pins are required. Also, it consumes less power (3.3v) and is of low cost when compared to other micro controllers /processors like Arduino and Raspberry pi.Node MCU is connected to ultrasonic sensors, gas sensor, temperature sensor, IR sensor. All the values are connected and send to Cloud server.

Fig. 6. Photo representing Node MCU

The ESP8266 is designed and manufactured by Espressif Systems. NodeMCU contains all crucial elements of the modern computer: CPU, RAM, networking (Wi-Fi), and even a modern operating system and SDK. When purchased at bulk, the ESP8266 chip costs just $2 USD a piece. The features like establishing a Wi-Fi connection with just few lines of code, Plug and play mode, Programmable Wi-Fi module and Arduino like software and hardware I/O made NodeMCU an IoT Tool that is best suitable for various applications based on IoT. It has a deep sleep mode which consumes 60mA is useful for low power consumption of an application. Some more features of NodeMCU are:

- Voltage:3.3V.
- Wi-Fi Direct (P2P), soft-AP.
- Operating current Average: 80mA
- Flash memory attachable: 16MB max (512K normal).
- Integrated TCP/IP protocol stack.
- Processor: Tensilica L106 32-bit.
- Processor speed: 80~160MHz.
- RAM: 32K + 80K.
- GPIOs: 17 (multiplexed with other functions).
- +19.5dBm output power in 802.11b mode
- 802.11 support: b/g/n.

GPS Module:
Node MCU is ESP8266 based advancement board. It highlights ESP-12E as its handling center. It is a 32bit MCU. It has 14 GPIO pins, single channel 10 bit coordinated ADC. It bolsters UART, I2C, SPI correspondence. It is 3.3V perfectevent that you are new to Node MCU at that point read our Getting Started with Node MCU
It has four pins VCC, GND, Tx, Rx

Fig 7: Picture representing GPS module

Blynk Platform:
Blynk can control hardware remotely. It can display sensor data,visualize. The three main components of Blynk are Blynk server, Blynk libraries, Blynk app. Using Blynk app we can create different widgets according to the requirements. Blynk server is responsible for the communication between hardware and the smartphone.
Features of Blynk platform:

1. Can connect cloud using WIFI, Bluetooth, USB, GSM
2. Easy to use Widgets
3. Emails, twitter, notifications can be sent

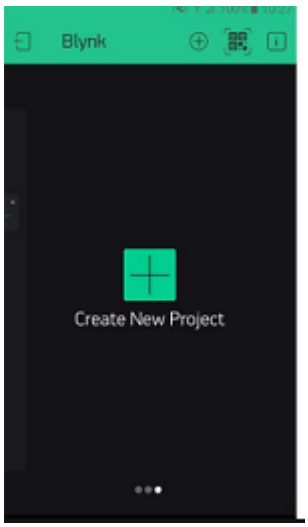

Fig 8: picture representing Blynk application

The project should be created in the Blynk after installation and with a particular id project should be created. Then a key is generated to the given mail id and with that particular key hardware can be connected to the cloud platform.

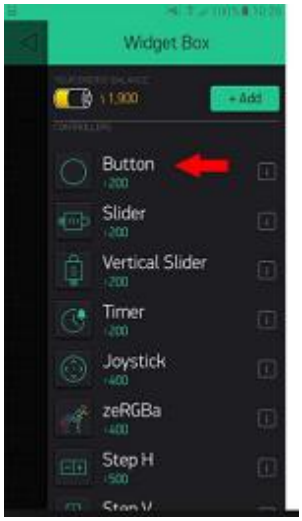

Fig 9: Image of widgets

There are many widgets in the Blynk application. Each widget has its own settings and the widgets are the button, value, slider, timer, joystick,maps .

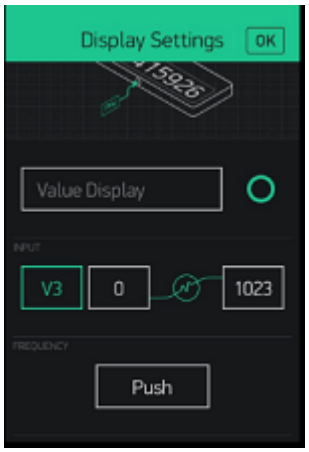

Fig 10: Picture representing widget in Blynk app

Selection of pins is important in the widget. There is Digital pin, Virtual pin and Analog pin, a particular frequency can be selected,We can select on the play button and run the project.

IV. RESULT AND DISCUSSION

Experimental Setup:

Fig 11: Set up of Vehicle monitoring and tracking setup

All the values of the sensors are collected by NodeMCU and are sent to Blynk application.

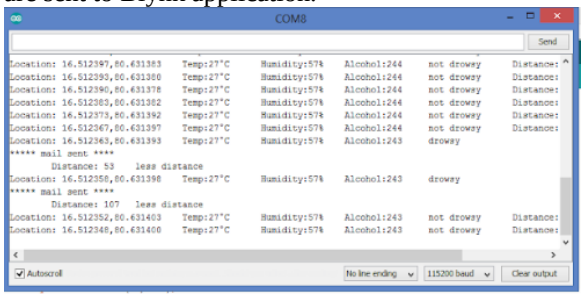

Fig 12: screenshots representing the values and the message displayed on the serial monitor

The location details, temperature conditions, and the alcohol values and state of the person are displayed on the serial monitor, the values of the sensors exceed then notification message will be displayed on the serial monitor

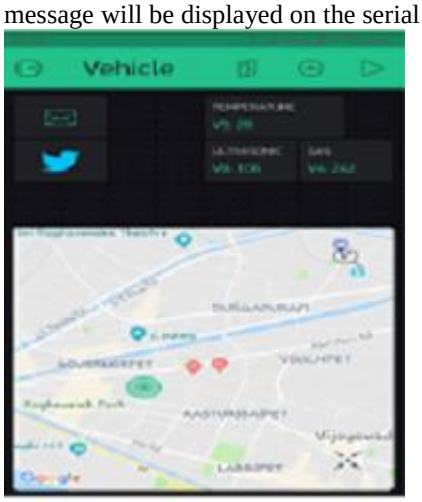

Fig 13: values displayed on the Blynk application and live location of the Vehicle is displayed on the Blynk

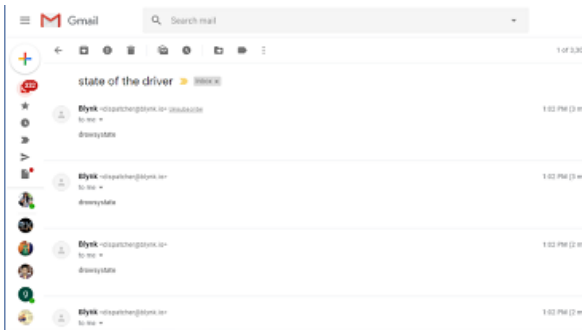

Fig 14: Screenshots showing the alert messages to the email about the state of the driver

V. CONCLUSION

Implementation of Vehicle Monitoring and Tracking system is implemented using Ultrasonic sensor, Gas sensor, IR sensor, Temperature sensor, GPS Module to increase the safety of the driver and to avoid accidents, By using this system constant checking of the driver and also the conditions of the car is checked and also the location of the vehicle is traced. The driver or the person in the car is alerted by the mobile application. The system is cost-effective, dynamic and efficient

REFERENCES

1. **ManaliShilimkar** "Survey Paper on Vehicle Tracking System using GPS and Android", International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 3 Issue 11, November 2014
2. **A.Anusha** "Vehicle Tracking and Monitoring System to Enhance the Safety and Security Driving Using IoT" 2017 International Conference on Recent Trends in Electrical, Electronics and Computing Technologies (ICRTEECT), July 2017
3. **Mayuresh Desai**"Internet of Things based vehicle monitoring system" 2017 Fourteenth International Conference on Wireless and Optical Communications Networks (WOCN) IEEE, Feb 2017
4. **Navod** "Vehicle Monitoring, controlling andtracking System by using android application",International Journal of Technical Research and Applications,Volume4,Isuue1
5. **prasanth** "Advanced vehicle monitoring and tracking system based on Raspberry Pi", 2015 IEEE 9th International Conference on Intelligent Systems and Control (ISCO).
6. **Harum** "Vehicle Detection and Tracking System IoT based",International Research Journal of Engineering and Technology (IRJET),Volume-5,Issue-8.
7. **Imteaj**"Smart Vehicle Accident Detection and Alarming System Using a Smartphone", conference: 2015 International Conference on Computer and Information Engineering (ICCIE),November 2015
8. **Das** "Vehicle accident prevent cum location and monitoring system", 2017 8th Annual Industrial Automation and Electromechanical Engineering Conference (IEMECON),August 2017

AUTHORS PROFILE

Boddapati Venkata sai Padmaja
Student in department of Electronics and computer Engineering BTech 1V/1V in Koneru Lakshmaiah Education foundation, Vaddeswaram AP India.

Dr K. Venkata Ratnam
He received M.Sc (Electronics) Degree from Acharya Nagarjuna University, Andhra Pradesh in 2003, M.Tech (Embedded Systems) degree from Bharath University, Chennai, Tamilnadu in 2006 and Ph. D (VLSI & Embedded Systems) degree in Electronics and Communication Engineering from NIT-Rourkela, India in 2016. He is currently working as an Associate Professor in the department of Electronics and Computer Engineering in K L E F, Andhra Pradesh, India. His current research interests include IoT, VLSI &Embedded Systems, Solar Cells and MPPT.

Kota Syam Sai
Student in department of Electronics and computer Engineering BTech 1V/1V in Koneru Lakshmaiah Education foundation, Vaddeswaram AP India